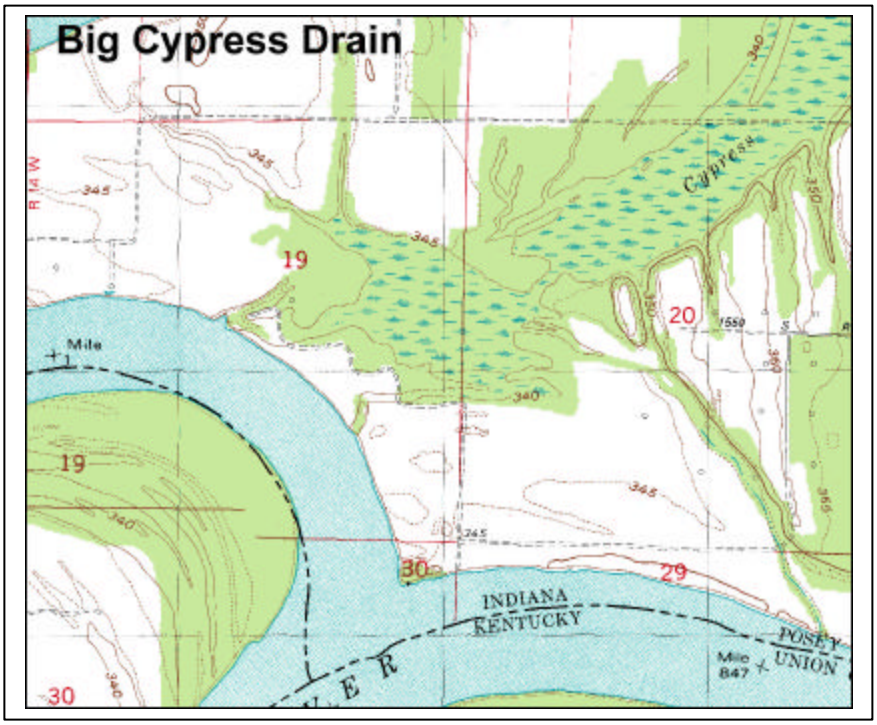
BIG CYPRESS DRAIN HABITAT RESTORATION (IN-04)

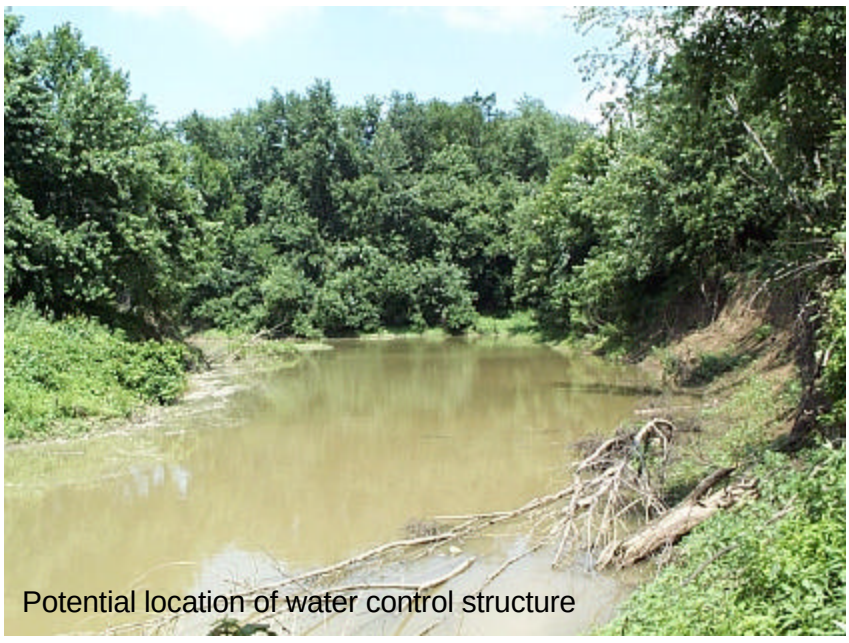
1.0 Location

The proposed Big Cypress Drain Habitat Restoration project area is located in Posey County, Indiana near the confluence of the Wabash and Ohio Rivers. The project area is in the Ohio River Smithland Pool at approximately river mile 847.5. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal, Description, and Rationale

The primary goal of the Big Cypress Drain project involves the acquisition of property in the area that will help meet the goal of the Indiana Department of Natural Resources (IDNR) and The Nature Conservancy (TNC) to acquire all of the lands within Big Cypress Slough. Project plans include construction of a water control structure and the reforestation of approximately 20 acres of agricultural fields adjacent to the Wabash River.


Potential location of water control structure

The installation of a water control structure will allow retention of water in the slough during fall and winter, and will allow normal spring and summer water fluctuations to occur. Water control in the slough will allow managers to implement wetland management strategies such as moist-soil impoundment and greentree reservoir management.

3.0 Existing Conditions

Terrestrial/Riparian Habitat: The terrestrial and riparian resources on the Big Cypress Drain project area consist mainly of riparian and bottomland hardwood forests and some agricultural lands. The dominant tree species in the area are silver maple (*Acer saccharinum*), black willow (*Salix nigra*), and box elder (*Acer negundo*).

Aquatic Habitats: Aquatic resources on the Big Cypress Drain project area consist mainly of shallow backwater habitat. A narrow channel draining most of Cypress Slough runs through the project area. The channel bank is highly eroded and apparently inputs large amounts of sediment into the slough channel.

Wetlands: Wetland resources on the project area are limited to some areas of bottomland forest. The riparian habitat in the project area is subject to flooding from the Wabash River. Natural swales within the riparian area probably pond water for a period of time, resulting in growth of hydrophytic vegetation and formation of hydric soils.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 11 federally-listed endangered species and 1 federally-listed threatened species known to occur in Posey County, Indiana. These species are listed on Table 1.

The riparian corridor adjacent to the Ohio River may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the Indiana bat.

Bald eagles may utilize forested areas for roosting/perching habitat and feed in the open water areas. There are no known eagle nests in the project area.

All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water. There does not appear to be suitable habitat for these species in the immediate vicinity of the project area.

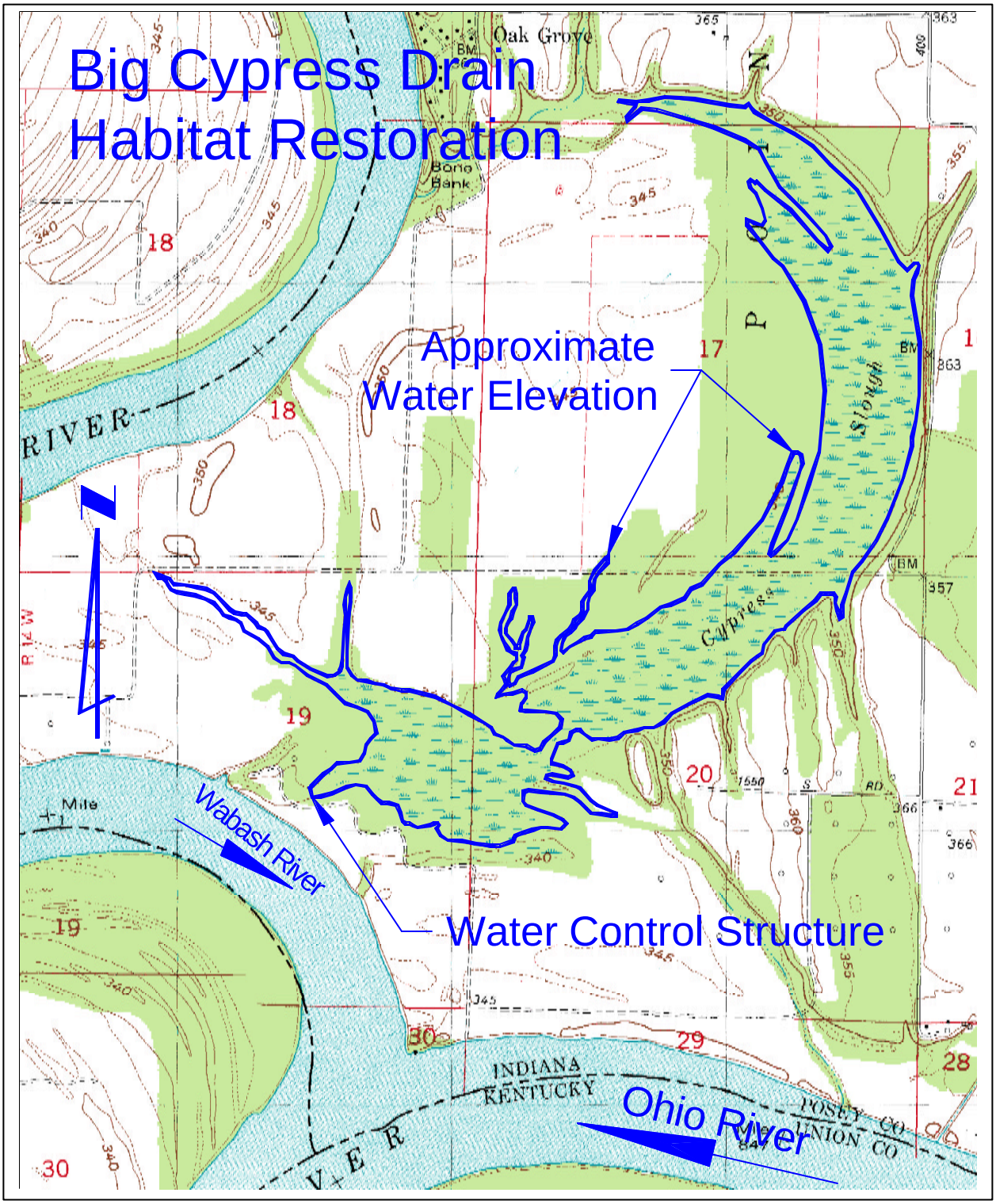
The American burying beetle is generally associated with upland habitats such as grassland prairie, forest edge, and shrubland. It is unlikely that the beetle would be found on the project area.

Table 1. Federally-listed species known to occur in Posey County, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	*Myotis sodalis*	Endangered	Yes
bald eagle	*Haliaeetus leucocephalis*	Threatened	Yes
eastern fanshell pearly mussel	*Cyprogenia stegaria*	Endangered	No
tubercled blossom mussel	*Epioblasma torulosa torulosa*	Endangered	No
pink mucket pearly mussel	*Lampsilis abrupta*	Endangered	No
ring pink mussel	*Obovaria retusa*	Endangered	No
white wartyback mussel	*Plethobasus cicatricosus*	Endangered	No
orange-foot pimpleback mussel	*Plethobasus cooperianus*	Endangered	No
clubshell mussel	*Pleurobema clava*	Endangered	No
rough pigtoe mussel	*Pleurobema plenum*	Endangered	No
fat pocketbook mussel	*Potamilus capax*	Endangered	No
American burying beetle	*Nicrophorus americanus*	Endangered	No

Source: U.S. Fish and Wildlife Service, 1999

4.0 Project Diagram



5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

The primary concern is the lack of water control and the desire to regulate water levels for multiple benefits, including habitat enhancement, protection, and restoration, waterfowl hunting, and non-consumptive public uses such as bird watching.

5.2 Levee Construction

A new levee would be constructed, 110-feet long, and contain a water control structure. The levee would be 7 feet tall with a top width of 8 feet, to allow for vehicle access. An inner core of cohesive material (impermeable), 7 feet high, with 1:1 side slopes would be used to control seepage. The remainder of the levee would be graded to 3:1 side slopes. The levee is not designed to protect from a certain storm event (i.e. 50-Year Storm). It is anticipated that the levee would overtop every few years. For this reason, yearly inspection is required to maintain the integrity of the levee.

5.3 Water Control Structure

A water control structure would be constructed to manage the water levels in Big Cypress Drain. The water control structure would be tied into the new levee as shown in the project diagram. An 81-foot-wide concrete weir would be place at the top of the structure. This weir would be 3 feet below the top of the levee. The weir would provide a stabilized location for overtopping. Three 5 feet by 5 feet precast concrete culverts, 16 feet in length, would be used as the primary watercourse. Each culvert opening is fitted with a steel gate to allow the water level to be regulated. Removable gate rails are provided to operate the gates. The truss system attaches to the top of the culvert, and the gates are lifted with a winch and pulley. The gates are able to remain in an open position with a locking cable, which will allow normal environmental fluctuations in the wetland. A stop log structure has been included in the weir to allow for greater water control. The areas below the weir and around the culverts would be protected from scour with grouted riprap. In addition, a pump station is provided to allow water control during high and low water periods. The pump station is equipped with a 150 horsepower pump, which can pump 4,000 GPM. The pump station can be setup to pump either from the river, or from the wetland.

5.4 Land Acquisition

Land acquisition for the Big Cypress Drain Restoration project area would be accomplished through purchase of land from willing sellers within the project area. Approximately 200 acres of privately owned land would be affected by the proposed project. Long term flowage/management easements may be purchased for this area in lieu of acquisition.

5.5 Reforestation

Approximately 20 acres will be reforested with native mast producing bottomland hardwood trees. Soil types, hydrology, and terrain position will be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical bottomland species to be planted in the floodplain area would include pin oak (*Quercus palustris*), swamp chestnut oak (*Quercus michauxii*), swamp white oak (*Quercus bicolor*), pecan (*Carya illinoensis*), and shagbark hickory (*Carya ovata*). Aggressive light

mast producing species, such as silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and/or willows (*Salix* spp), would be expected to regenerate naturally.

- Nursery stock for reforestation will be obtained from a State of Indiana Nursery.
- Bare root seedlings will be planted in a similar manner to ongoing reforestation efforts being conduction near the Hovey Lake Fish and Wildlife Area.
- Land acquisition will not be required. The land to be reforested is owned by the USACE.

5.6 Planning/Engineering Assumptions

- All cohesive materials (impermeable) for the levee can be obtain onsite.
- The levee is not designed to contain a specific design storm event. It is anticipated the levee will be overtopped. Yearly inspection will be required to ensure the integrity of the levee.

6.0 Cost Estimate (Construction)

Table 2. Project Costs.

Item	Cost
Land Acquisition (200 acres)	$205,000
Levee Construction	$2,700
Water Control Structure	$71,800
Pumping Station	$88,900
Mobilization	$25,000
Reforestation	$4,400
TOTAL	**$397,800**

7.0 Schedule

Table 3. Acquisition, Development, and Construction Schedule.

Item	Time
Land Acquisition	1-5 years
Levee Construction (4 days)	1-5 years
Water Control Structure (30 days)	1-5 years
Pumping Station (45 days)	1-5 years
Mobilization (4 days)	1-5 years
Reforestation	1-5 years
TOTAL	**5 years**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: The proposed project would provide several long-term benefits to terrestrial/riparian resources in the area. Decreased forest fragmentation in the area would benefit a variety of neotropical migrants. Reforestation of the riparian corridor would provide habitat and travel corridors for several species of wildlife.

Aquatic Habitats: Long-term beneficial impacts to aquatic resources would be anticipated as a result of completion of the proposed project. A planted shoreline buffer would reduce erosion

and sedimentation problems for sensitive aquatic species and provide fishery habitat in the floodplain.

Wetlands: Wetland resources in the project area would benefit from installation of the water control structure. Water control would allow management activities such as moist-soil management and greentree reservoir management to be implemented, which would benefit waterfowl, shorebirds, and a number of migratory birds of management concern.

The construction of moist-soil impoundments on the area would benefit wetland species such as waterfowl, rails, wading birds, and shorebirds. Successful moist-soil management practices have resulted in seed yields as high as 1350 kg/hectare on impoundments at Mingo NWR, Missouri (Reid et al., 1989). Moist-soil plants also provide structure for aquatic invertebrates, and these invertebrates provide important prey for waterfowl. Approximately 84% of bird species that utilized moist-soil impoundments in eastern Missouri consumed invertebrates as part of their diet (Fredrickson and Reid, 1986).

Greentree reservoir construction and management would also benefit many wetland species. Flooding strategies on greentree reservoirs would produce invertebrate populations earlier, more consistently, and in greater numbers relative to naturally flooded sites. Water management would also allow waterfowl to take advantage of seeds and fruit produced by trees in the bottomland hardwood ecosystem. Several species of waterfowl use forested wetlands during part of their annual life cycle. Mallards for example, use forested wetlands extensively during molting and pairing to obtain food resources and protection from predators (Reinecke et al., 1989).

Federally-Listed Threatened and Endangered Species: Reforestation of the project site could potentially benefit the Indiana bat and bald eagle. Successful reforestation would provide potential summer roosting habitat for the Indiana bat, and potential roosting/perching habitat for the bald eagle. There would be no foreseeable beneficial impacts to the federally-listed endangered mussel species or the American burying beetle as a result of implementing the proposed project.

Socioeconomic Resources: Implementation of the proposed project could result in long term beneficial impacts to socioeconomic resources through increased recreational activities. Hunting and birdwatching opportunities would be increased by the project.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be potential for both short and long term adverse impacts to terrestrial/riparian resources as a result of implementing the proposed project. Short-term impacts from construction activities could result in destruction of existing vegetation, erosion, and soil compaction. Greater public use of the restored areas may result in long-term impacts from increased vehicle traffic, noise levels, wildlife disturbance, and littering.

Aquatic Habitats: There would be a potential for some short term adverse impacts to aquatic resources as a result of implementing the proposed project. Construction activities for the development of wetlands could result in increased erosion and siltation, which could cause degraded water conditions.

Wetlands: There would be no reasonably foreseeable adverse impacts to jurisdictional wetland resources as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonably foreseeable adverse impacts to federally-listed threatened and endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be potential for some adverse socioeconomic impacts. Implementation of the proposed project would take some agricultural lands out of production, which could result in decreased opportunities for tenant farming.

10.0 Mitigation

Minor impacts associated with site restoration may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts. No other mitigation would be necessary for this project.

11.0 Preliminary Operation and Maintenance Costs:

Table 4. Operation and Maintenance Costs

Maintenance	Frequency	Costs
Levee inspection	1 Year	$1,000
Levee maintenance	10 Years	$5,000
Water control structure maintenance	1 Year	$5,000

12.0 Potential Cost Share Sponsor(s)

- Indiana Department of Natural Resources
- Ducks Unlimited
- Wild Turkey Federation
- Private corporations

13.0 Expected Life of the Project

As presently envisioned the Big Cypress Drain project area will be managed in perpetuity for the benefit of natural resources by the Indiana Department of Natural Resources.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project site is located at the connection of Big Cypress Slough to the Wabash River near the river's confluence with the Ohio River in Posey County, Indiana. The nearest town to the Ohio River-Wabash River confluence is Uniontown, Kentucky, which is located along the south bank of Ohio River at river mile 842.5.

The following environmental conditions were considered when conducting the June 29, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

None of the environmental conditions listed above were observed on the project area.

15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to or within each concept site was collected from the county courthouse of the respective county of each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map\parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office. Plat\parcel maps were collected for each site.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used in each State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is 33.3 percent for Indiana.

The above ratios were used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that private lands are adjacent to the Big Cypress Drain Habitat Restoration area. Private lands will be needed and/or disturbed for this project. The majority of the property under consideration is in private ownership, therefore acquisition, easements, or other agreements will need to be made prior to further progress.

Table 5. Property Characteristics				
Site Name: Big Cypress Drain **Location: Posey County, Indiana**				
Map/Parcel Number	**Owner**	**Mailing Address**	**Market Value**	**Acreage**
383/04	Mack Curtis & Louis Allyn, et al	C/o Allyn Simpson 1900 Greenbrier Drive Mt. Vernon, IN. 47620	$9,800	40
383/05	Louis Allyn, et al	C/o Allyn Simpson 1900 Greenbrier Drive Mt. Vernon, IN. 47620	$10,900	43.16
383/06 (part)	Otis Allyn (Trustee)	C/o Old National Bank Mt. Vernon, IN. 47620	$2,900	16.75
383/07 (part)	Posey County Farms, Inc.	C/o Duane Collier 11700 Bonebank Road Mt. Vernon, IN. 47620	$21,800	133.65
384/01 (part)	Otis Allyn (Trustee)	C/o Old National Bank Mt. Vernon, IN. 47620	$16,500	84.50
* Denotes improvements on property.				

16.0 References

Fredrickson and Reid, 1986	Fredrickson, L.H. and F.A. Reid. 1986. Wetland and riparian habitats: a nongame management overview. Pages 59-96 in J.B. Hale, L.B. Best, and R.L. Clawson, eds. Management of nongame wildlife in the midwest: a developing art. North Central Section Wildlife Society, Chelsea, Michigan.
INHS, 1996	Illinois Natural History Survey Reports, March-April 1996. Survey Document #2152. Center for Biodiversity (J. Hofmann).
Reid et al., 1989	Reid, F.A., J.R. Kelly, T.S. Taylor, and L.H. Fredrickson. 1989. Upper Mississippi Valley Wetlands-Refuges and Moist-soil Impoundments. In L.M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat Management for Migrating and Wintering Waterfowl in North America. Texas Tech University Press, Lubbock, Texas
Reinecke et al., 1989	Reinecke, K.J., R.M. Kaminski, D.J. Moorhead, J.D. Hodges, and J.R. Nassar. 1989. Mississippi Alluvial Valley. in L.M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat Management for Migrating and Wintering Waterfowl in North America. Texas Tech Univ. Press, Lubbock.
USFWS, 1999	U.S. Fish and Wildlife Service. Federally Endangered, Threatened, and Proposed Species, Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location: The proposed Big Cypress Drain Habitat Restoration project area is located in Posey County, Indiana near the confluence of the Wabash and Ohio Rivers. The project area is in the Ohio River Smithland Pool at approximately river mile 847.5. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan selected: The primary goal of the Big Cypress Drain project involves the acquisition of property in the area that will help meet the goal of the Indiana Department of Natural Resources (INDNR) and The Nature Conservancy (TNC) to acquire all of the lands within Big Cypress Slough. Project plans include construction of a water control structure and the reforestation of approximately 20 acres of agricultural fields adjacent to the Wabash River.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? No and description

Larger Size Plan Possible? No and description

Other alternatives? No

Restore/Enhance/Protect Terrestrial Habitats? Yes **Objective numbers met** T1, T3

Restore, Enhance, & Protect Wetlands? Yes **Objective numbers met** W1, W4

Restore/Enhance/Protect Aquatic Habitats? Yes **Objective numbers met** A1, A7, A8

Type species benefited: Riverine fishes and resident and migratory wildlife.

Endangered species benefited: Potential benefits to Indiana bat and bald eagle.

Can estimated amount of habitat units be determined: No

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Indiana Dept. of Natural Resources

Plan considered complete? Yes **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No
Real Estate privately owned? Yes
If privately owned, what is status of future acquisition Unknown

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Yes The plan provides additional habitat and habitat diversity for terrestrial and aquatic species.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

Unknown

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

W4 Herbaceous Emergent Wetlands: Moist-soil habitats

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)